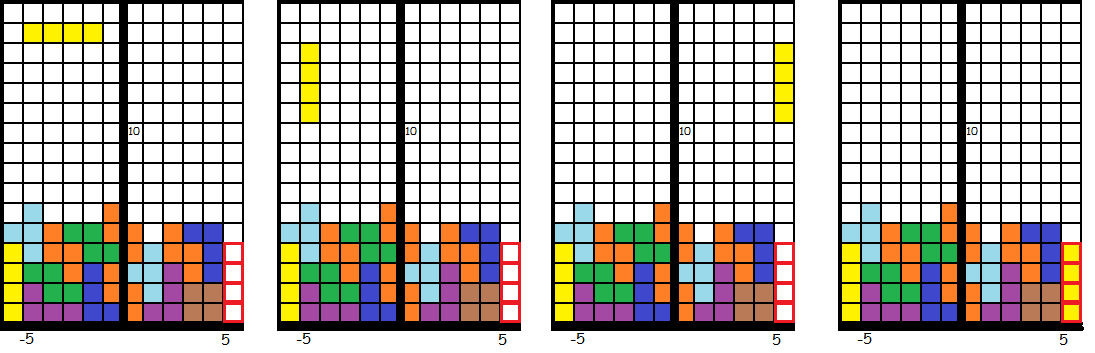
Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_ Per.: \_\_\_\_\_\_\_\_\_

**THE GEOMETRY OF TETRIS - Project Introduction**

Tetris is a game that has achieved worldwide popularity since its release in 1984. We will look at geometric transformations that can be used in this game. In the traditional Tetris game, a player is allowed only to rotate and translate objects. We will represent the rotations and translations of the game play using typical mathematical notation. Study the sequence of moves below required to place the falling yellow piece into the location outlined in red.



Move 1 Move 2 Move 3

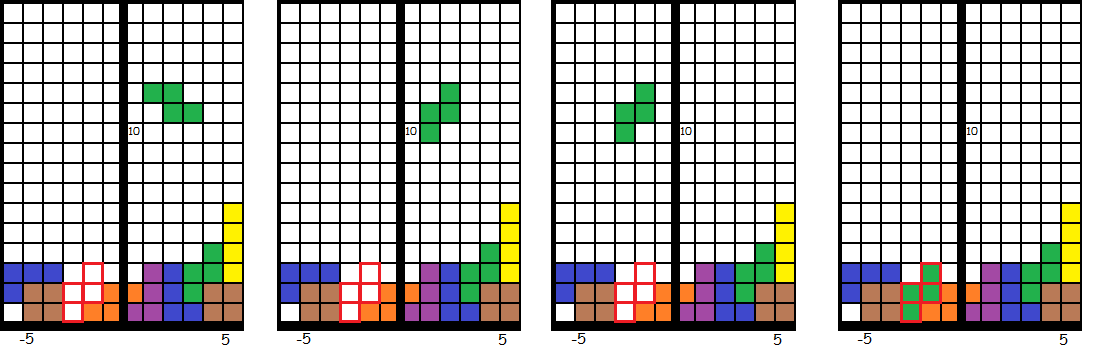
Move 1: Rotate 90° clockwise about (–5, 14).

Move 2: Translate 10 units to the right.

Move 3: Translate 10 units down.

One way to define an ***isometry*** is as a transformation that **preserves distance or length**. We have learned that translations, rotations, and reflections are isometries.

For the Tetris moves shown below, write the sequence of moves as a **composition** of **isometries**.





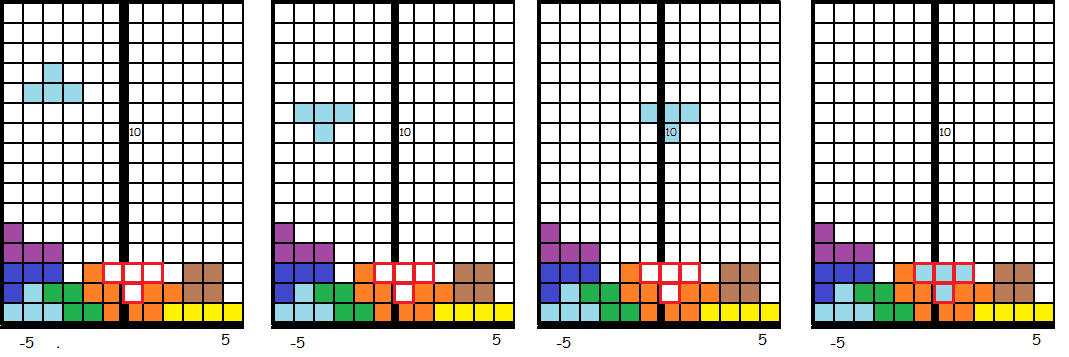
Move 1 Move 2 Move 3

Move 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Move 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Move 3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The original game of Tetris does not allow for reflections. We are going to allow for reflections as a possible move. We will need to identify the line of reflection. Write the sequence of moves to take the light blue piece into the location outlined in red.



Move 1 Move 2 Move 3

Write the sequence of moves as a composition of isometries.

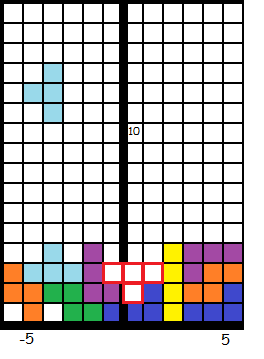
Move 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Move 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Move 3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

For each of the four Tetris boards numbered below, write the sequence of moves required to move the piece into the desired location. Try to use the minimum number of moves possible. Then write the moves as a composition of isometries.

***Board 1***



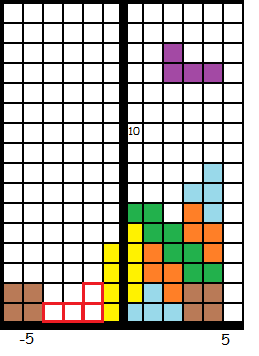
Moves: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Board 2***



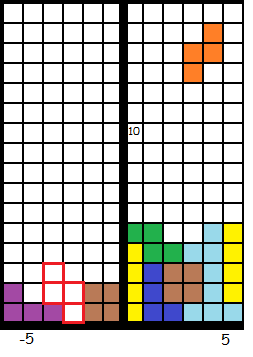
Moves: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Board 3***



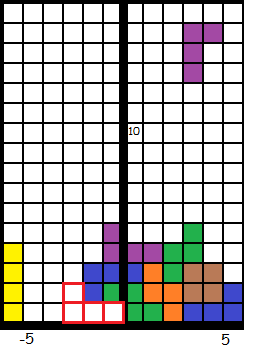
Moves: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Board 4***



Moves: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**TETRIS PROJECT!**

**Requirements:**

PART 1

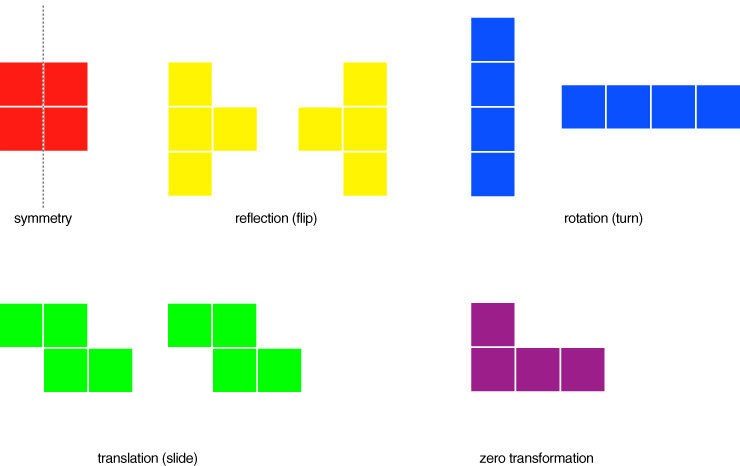
Using GRID 1, create the following:

1. You must have at least 10 figures already resting on the bottom of the grid.
2. You must have a red outline (as our examples did) for the **image** (where your figure will be after the transformation occurs).
3. Your transformation must include at least 3 moves: 1 translation, 1 reflection, 1 rotation. Reflections must include a line of symmetry and rotations must include a center and degree of rotation, including direction (clockwise or counterclockwise). You are limited to 90o, 180o, and 270o rotations.
4. Using GRID 2, recreate the same set up from #1 on a new grid and complete #2-4 using a new set of transformations **with the same end result**.

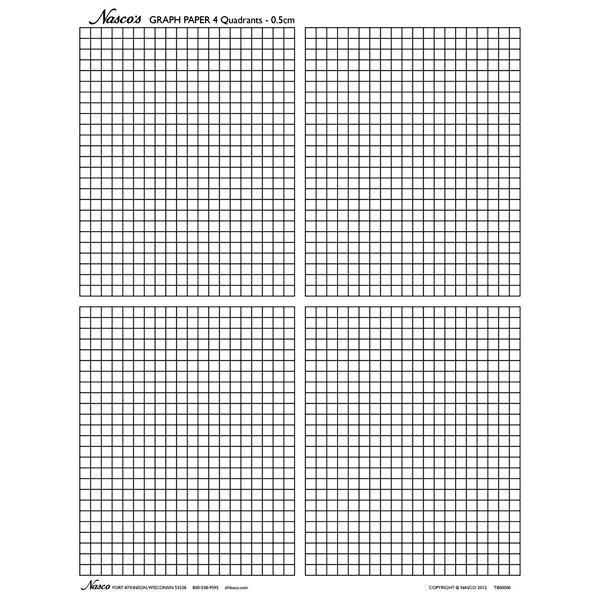
PART 2

Using GRID 3, create a figure of at least 10 Tetris shapes that meets the following requirements:

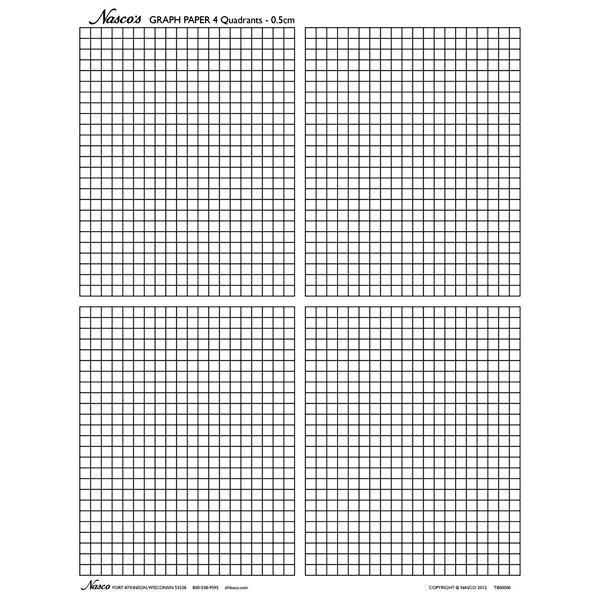
* 1. has at least two **lines of reflection**
  2. has an **order of rotation** of at least 2



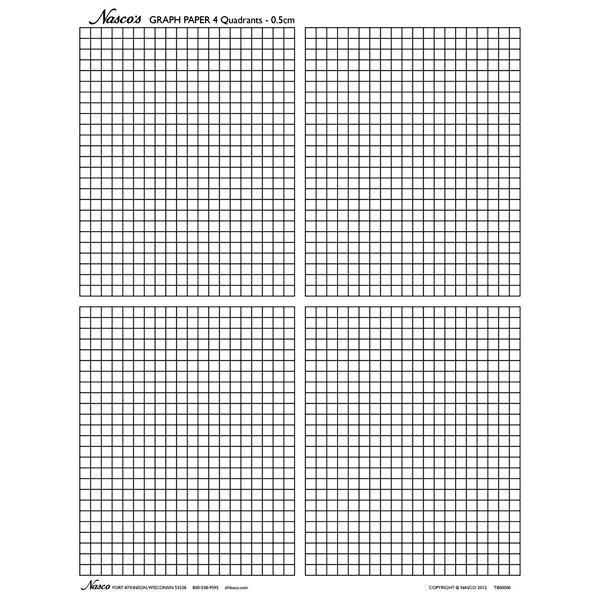
**GRID 1**



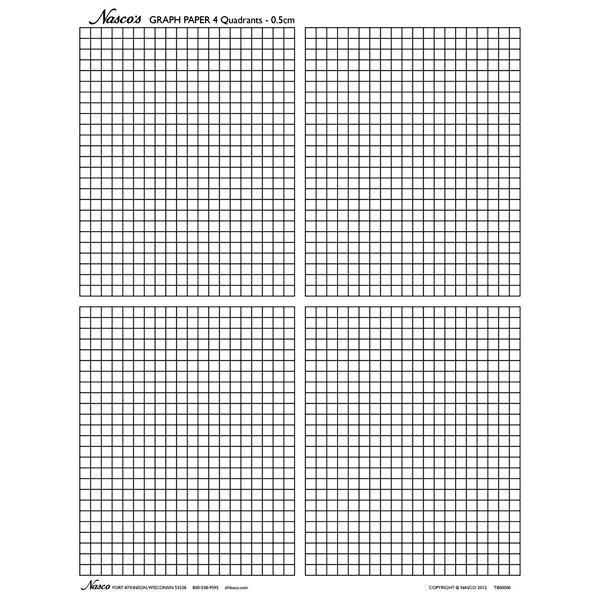
**GRID 2**



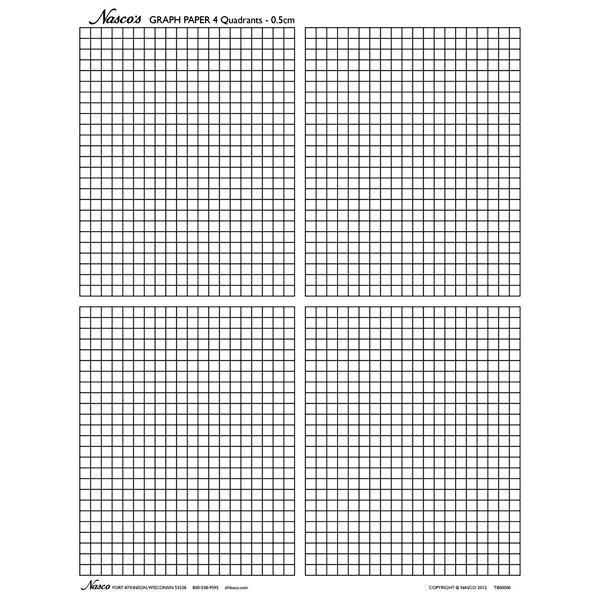
**GRID 3**



**DRAFT GRID**



**DRAFT GRID**



**DRAFT GRID**

